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Mobile Instrument Passes Important Milestone

A patent-pending, suitcase-size instrument that scientists could deploy virtually anywhere to measure three important carbon-cycle gases has achieved an important milestone in its development.

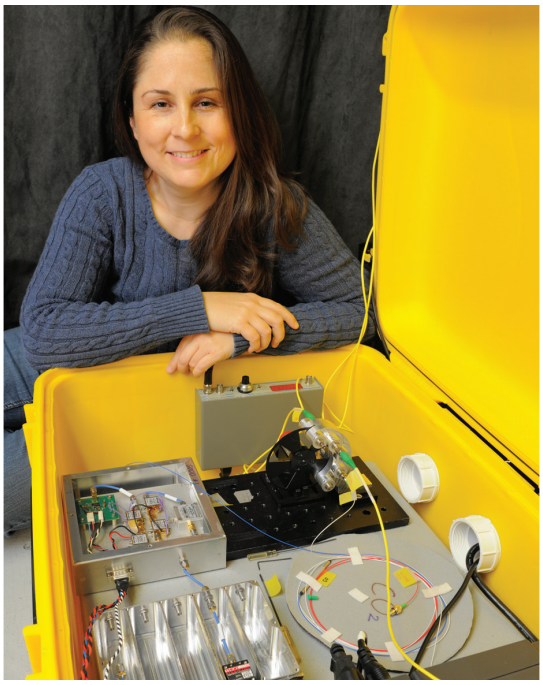
In September, Principal Investigator Emily Wilson Steel carried out a field campaign in Park Falls, Wisconsin, to demonstrate for the first time the mini-laser heterodyne radiometer (mini-LHR), an affordable, highly mobile instrument that measures the concentrations of carbon dioxide, methane, and carbon monoxide in the atmospheric column.

"The raw data looks great," Steel said. "We're officially past the initial-development stage. Now we're focusing on the retrieval algorithm that will calculate the column and extract altitude profiles."

While awaiting the award of her instrument patent, Steel said that she and her team are tweaking its design to further reduce its size and ruggedize its components. Ultimately, the goal is to license the technology to industry. Four companies already have expressed interest in commercializing the instrument, she said, adding that in addition to scientists, the instrument would be ideal for power companies and others who need to monitor carbon emissions.

The need for a turnkey, highly mobile instrument is unmistakable, Steel said. Currently, the only ground-based network that measures carbon dioxide and methane in the atmospheric column is the Total Carbon Column Observing Network (TCCON). However, only two of its 16 sites are in the U.S., including one facility in Wisconsin where Steel conducted her field campaign. TCCON's instruments can measure the largest range of trace gases, but the network is sparse due to instrument cost and size, she said.

Steel's instrument, developed with Goddard R&D funding, overcomes those disadvantages, she said. Packaged literally inside a suitcase, users could easily deploy the relatively inexpensive instrument anywhere in the world, including the Arctic, a region not covered by NASA's Orbiting



Carbon Observatory-2. Steel also believes the mini-LHR could be used to calibrate and validate space-based missions measuring greenhouse gases.

Just as exciting is its potential to give scientists a far more complete picture of carbon-cycle gases in the atmosphere. The new instrument works in tandem with the passive aerosol sensor currently used in NASA's AERONET, a Goddard-run network of more than 450 aerosol-monitoring instruments worldwide. Because her instrument piggybacks with AERONET, NASA could rapidly deploy the instrument to any of the network's sites.

"We're not trying to compete with the TCCON or other measurement approaches. We're simply providing a tool to carry out targeted measurements of some key species to fill in data gaps," she said. "With this instrument, I think we'll have plenty of customers." ❖

CONTACT

Emily.L.Wilson@nasa.gov or 301.614.6155

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